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# PATENT SPECIFICATION

DRAWINGS ATTACHED

914.652



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International Classification:—G07d. G01q.

## COMPLETE SPECIFICATION

### Improvements in or relating to Coin Sorting Apparatus and Recording Mechanism

I, ALFRED EDWARD BONE, a British Subject, of the Royal Mint, London, E.C.3, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for sorting into separate denominations a number of mixed coins which can be fed to the sorting apparatus in batches, and to a counting and recording mechanism, which sorting apparatus and counting and recording mechanism can be employed in combination. This coin sorting apparatus separates the coins of different denominations according to their diameters and feeds the separate coins to their respective collecting stations.

According to this invention in a coin sorting and counting and recording apparatus, uniform sized recesses or pockets are provided to convey the coins during part of their travel to their collection stations whereby the coins project beyond the said recesses or pockets to different extents depending upon their diameters and a controlling member, movable by each of the coins as it travels in a recess or pocket, operates mechanism to actuate and select the counting and recording mechanisms for recording the value of the coin passing said controlling member. Each of the recesses or pockets may include two straight-edges which converge towards one another from the mouth of the recess or pocket. The individual coins received in said recesses or pockets are passed in face to face contact with a surface across a series of apertures in said surface, which apertures are of progressively increasing widths corresponding to the diameters of the coins to be sorted. Each coin passes across such series of apertures until it is accepted by an aperture having a width slightly more than the diameter of the coin, whereupon it passes from the pocket or recess into a chute or like conveying means to a collecting station.

Separate chutes are provided to co-act with the separate apertures so that each denomination of coin is collected at a separate station. Recording mechanisms may have associated therewith batching mechanism which renders the sorting apparatus inoperative when a predetermined number of coins has been fed to the coin collecting receptacle at any one of the coin collecting stations. Resetting means are then also provided to enable the sorting apparatus to become operative again when, for example the fully filled coin receptacle has been replaced.

The invention is illustrated by way of example in the accompanying drawings in which Figure 1 is a front view of a machine, Figure 2 is a section on the line II—II, Figure 1,

Figure 3 is a view taken on the line III—III, Figure 2 with the casing, hopper and other parts omitted, and

Figure 4 is a view taken generally on the line IV—IV, Figure 2, with the casing and other parts omitted.

The machine shown in the drawings is intended for sorting three denominations of coins in this particular case three-penny pieces, six-pences and shillings, and separately recording the values of each denomination in addition to the total values, and there is provided a hopper or coin receiving receptacle 1, with an inclined flat bottom 2. Resting upon or with its under face in close proximity to the flat bottom of the hopper or receptacle is a rotary coin conveying disc 3, provided around its periphery with a plurality of uniformly spaced recesses or pockets 4, of similar shape and size for the reception of coins. This coin conveying disc is driven from a main driving shaft 5, through a worm 6 and worm wheel 7, so that it advances one station, i.e. the distance between centres of adjacent recesses or pockets, for each revolution of the main driving shaft 5. Coins engaging the recesses or pockets, when they are at the lower end of the inclined flat

bottom of the hopper, are conveyed through 180° or more to the upper end of the inclined hopper bottom 2 where the recesses or pockets are passed over three elongated coin receiving apertures 8, 9 and 10 formed in the floor of the hopper and located in register with the path of travel of the coins. These apertures are successively of increasing width so that as the coins slide across such apertures the sixpences only drop, under the action of gravity, through the first aperture 8, which rejects the three-penny pieces and shillings as they are of greater diameter than the width of the said aperture. Subsequently the three-penny pieces drop through the second aperture 9, and the shillings drop through the third aperture 10. Separate chutes 11 convey the coins from the several apertures to separate bags or other suitable coin collecting receptacles. Prior to passing over the coin receiving apertures each coin engages a roller 13, on a record controlling pin 14, disposed with its axis parallel to the axis of the disc 3, to move the pin radially away from the rotary coin conveying disc 3. This pin 14 is carried on a spring pressed arm 15, pivoted at 16. The coin conveying disc 3 is preferably of less thickness than that of the coins so that only one coin engages in a coin engaging recess or pocket 4, at any one time. However, in order to prevent a coin being fed to the coin receiving apertures without it being recorded, a masking plate 17 may be provided in close proximity to and parallel to the coin conveying disc to cover the coin receiving recesses or pockets prior to them passing the record controlling pin 14, and until they pass clear of the coin receiving aperture of greatest width. Secured beneath the masking plate 17, or mounted separately therefrom may be leaf springs located above the coin receiving apertures and adapted to have wiping contact with the upper faces of the coins, such springs serving to assist in ejecting the coins into the appropriate coin receiving apertures.

Since the recesses or pockets in the coin conveying disc are of similar shape and size the coins project beyond the periphery of said coin conveying disc to differing extents dependent upon the diameters thereof. In consequence shillings impart the greatest radial movement to the record controlling pin 14, three-penny pieces a lesser movement and sixpences the least movement. This record controlling pin 14 extends into engagement with and actuates a pivotally mounted segmental plate 19, having its pivot in alignment with the pivot 16. The edge of the plate 19 remote from its pivot is stepped or formed with sections which are at different distances from the pivot of the plate. A stop plate 20 is provided with an upturned end or nose 21, which coacts with the stepped edge of the segmental plate, said stop plate 20 being mounted on a gate consisting of selector bar 22, which lies

parallel to the main driving shaft and is spring loaded to move the nose 21, of the stop plate 20, towards the stepped edge of the segmental plate 19. The selector bar is slidably supported in bearings in bearing brackets 23, 24 to permit it being moved longitudinally away from the segmental plate 19, against the action of a spring 25, once per revolution of the main driving shaft, by a cam 26, mounted on said main shaft 5, which acts upon one end of a centrally pivoted lever 27, whose other end carries an adjusting screw 28, that engages a stud 29, carried on a bracket 30, secured to the selector bar 22. The spring 25 is located between the bearing bracket 24, and the bracket 30, and serves to resist such movement and to restore the nose 21 into engagement with the segmental plate when the cam permits. The selector bar 22 has an upturned edge having notches 31, 32, 33 and 34, suitably disposed therein which are located from time to time, by controlled longitudinal movement of the selector bar, in positions determined by which stepped part of the segmental plate the nose 21, of the stop plate 20, engages. The positions of these notches determines which recording mechanisms are operated, as hereinafter described.

Two sets of recording mechanisms are employed, one of which sets includes separate recording mechanisms for recording the value of the three-penny pieces, the sixpences and the shillings in a batch of coins of different denominations fed to the hopper, the values of which are respectively shown in windows 35, 36, and 37 (Fig. 1) and a recording mechanism for recording the total value of such batch of coins which is indicated in window 38. Zeroizing means co-act with these recording mechanisms, which means, in the case of the batch recording set, may be manually operated by a lever or any other suitable device to move such recording mechanisms to zero indicating positions when a batch of coins fed to the hopper has been counted and sorted. The second set of recording mechanisms, which may record higher values, record the total values of each denomination of coin and the total value of all coins sorted by the machine over an extended period of time, e.g. during one day, such values being respectively indicated in windows 40, 41, 42 and 43.

Each recording mechanism consists of a group of recording or counting wheels with associated transfer means and the four such mechanisms comprising the batch recording set are mounted with their wheels in axial alignment i.e. on a spindle 39, whilst the second set of four recording mechanisms for recording total values are mounted with their wheels in axial alignment on a second spindle 44, parallel to the first mentioned axis.

The primary wheels of the recording mechanisms actuated in respect of three-penny pieces are graduated to indicate threepence at

each stage of rotation, whilst the primary wheels of the recording mechanisms concerned with sixpences are numbered to indicate sixpence at each stage of rotation i.e. 6 and 0 alternately. In the case of the shillings recording mechanisms the primary wheel carries a series of ciphers and is fixedly connected to the second wheel which carries numerals 0—19. Associated with each recording mechanism and rotatable about the axis thereof is a disc 45, carrying pawls 46, which engage internal teeth on the primary wheels of such recording mechanism. The pawl carrying discs 45, on the spindle 39, are connected with their corresponding pawl carrying discs 45 on spindle 44, by a connecting rod 47, so that the means for recording the batch value and the total value of each denomination are simultaneously and equally advanced. Likewise the means for recording the batch value and total value of all coins are also simultaneously and equally advanced an amount determined by the value of the coin recorded.

Each pawl carrying disc rotatable about the spindle 44 is provided with a radial finger or projection 48, which normally is spring pressed against the selector bar 22, but can pass through its associated notch 31, 32, 33 or 34 in said bar if such notch is moved into register therewith. The extent of such travel, in the case of the discs associated with the recording mechanism for recording the values of the separate denominations, is determined by an extension 49, of the radial finger or projection 48, which extension serves as a stop which engages the selector bar when movement of the finger or projection through a notch has permitted its disc to rotate sufficiently to move the pawls thereon one tooth space over the internal teeth on the primary wheel of its recording mechanism. In the case of the recording mechanism for the total value of coins, the outer end of the radially extending finger or projection of the pawl carrying disc is stepped and co-acts with notch 34, in the selector bar, which notch is considerably wider than the notches 31, 32 and 33. This wide notch has parts of different depths whereby, depending upon which part of the notch is brought into register with the finger or projection, the finger or projection can pass through the notch to an extent sufficient to enable the pawls on the pawl carrying disc to slide over one or two teeth. However, should the upturned edge of the selector bar move clear of the path of movement of the finger the stepped projection can move into contact with the main part of the bar during which movement the pawls can slide over four teeth. The pawl bearing discs rotatable about the spindle 39 are also provided with radial extensions 50, whilst extending parallel to this spindle 39, and just below the recording wheels thereon is a swinging bar 51 supported at its ends on arms 52 pivotally mounted to

turn about said spindle 39. The arms 52, at their ends remote from their pivots, are joined by connecting rods 53, to a bar 54, to which is secured at 55 a rocking arm 56, fixedly mounted upon a shaft 57, to which is also fixedly mounted a second rocking arm 58, carrying a roller 59, that engages a second cam 60, on the main shaft 5. Under the action of the cam 60, and against the resistance of a spring 61, disposed about the shaft 57, the bar is caused to swing in an arc of approximately 90° about the spindle 39 during each revolution of the main shaft. The bar 51, during such movement hereinafter referred to as the forward movement, engages the displace finger or projection of any disc on spindle 39 that has been displaced to record passage of a coin and at the end of such forward movement ensures that all the pawl carrying discs occupy their normal positions.

The several mechanisms are so co-ordinated that as a coin is about to pass the record controlling pin 14, the cam 26, on the main driving shaft 5, moves the selector bar 22, longitudinally against the action of its spring 25, so that the nose 21, of the stop plate 20, disengages the stepped edge of the segmental plate 19. As such disengagement takes place the segmental plate is moved about its pivot, by actuation of the controlling pin 14, to a position corresponding to the denomination of a coin actuating the record controlling pin, whereupon the selector bar 22, is acted upon by its spring 25, to move the nose 21, of the stop plate 20, into engagement with the appropriate part of the stepped edge of the segmental plate 19. This enables one of the notches 31, 32 or 33, in the selector bar to register with its associated finger or projection 48 of a pawl carrying disc on spindle 44, associated with the recording mechanism for the denomination of the coin to be recorded, and to bring the finger or projection of the pawl carrying disc of the recording mechanism for the total amount into register with the correct part of the wide notch 34, in the selector bar. In consequence one of the fingers or projections associated with a denomination total recording mechanism passes through the registering notch 31, 32 or 33, and rotates its disc and the corresponding pawl carrying disc about the spindle 39, sufficient for the pawls thereon to ride over one tooth of their associated internal toothed rings in the primary counting wheels. At the same time the pawls of the pawl carrying discs of the total recording mechanisms ride over one, two or four teeth of their co-acting toothed rings according to the value of the coin being recorded. In addition the fingers or projections 50 on the actuated pawl bearing discs movable about the spindle 39, are also advanced towards the swinging bar, the extent of such movement being equal to the movement of the fingers or projections 49, on the correspond-

ing discs movable about the spindle 44. Thereafter the second cam 60, on the main driving spindle 5, actuates the rocking arms 58, 56, to move the swinging bar 51 through approximately 90° and during such forward travel it engages that finger or projection of the pawl carrying discs movable about the spindle 39 which has been advanced and returns it to its normal position. Such returning action rotates the disc bearing such finger or projection and the corresponding disc movable about the spindle 44 so that they advance their primary wheels to record the value of the coin which has actuated the coin recording pin.

In connection with the above sorting and counting machine there may be employed batching mechanisms whereby the machine can be rendered inoperative when any of the coin collecting bags has fed to it a requisite amount of coins and can be restored to normal operation when, for example, the filled bag has been replaced. Such control may be effected by providing, in connection with each denomination recording mechanism associated with the spindle 44, a lever 62, pivoted at one end upon and rotatable with a spindle 63 which also carries with it a plate or comb 64 having up-turned teeth 64a, which, under the influence of a weak spring (not shown) acting on the lever, are pressed against the edges of the counting wheels 66. In the edges of the counting wheels are formed slots 67, which are so disposed that when one less than the requisite number of coins to be batched have been fed to a collecting bag, a slot will be in register with each of the teeth of the comb. The lever 62 is, however, restrained from movement by the radial extension 49, on the associated finger or projection of the pawl carrying disc of the recording apparatus. Thus, for example, in the case of the recording and batching of shillings which are usually bagged in hundreds (£5) the teeth of the appropriate comb will register with slots in the counting wheels of the recording mechanism registering shillings when ninety-nine shillings have been fed to a bag. As the hundredth shilling is registered and fed to its collecting bag the pawl bearing disc of the recording mechanism for shillings on the spindle 44 is rotated whereby the extension on its finger or projection is moved away from the lever 62, which is then moved about its pivot 63, by a spring (not shown) and the teeth 64a, of its comb engage the slots 67, with which they register. During this movement of the lever 62, a pin 68 at its free end moves into engagement with a cam surface 69 on the underside of a longitudinally movable batching bar 70 and also actuates a trigger 71, pivoted at 72, on the longitudinally movable batching bar, and moves it upwardly into the path of the swinging bar 51, so that during a part of its return movement from rotating the pawl bearing discs the said swinging bar, engages the trigger 71, and through it

moves the batching bar 70, longitudinally against the action of a spring 73, to a cut-off position, the swinging bar 51 moving clear of the trigger 71, before completion of the return or rearward movement of the former. At the same time the pin 68, by reason of the sliding engagement with the cam surface 69 on the batching bar therewith, is depressed, the teeth of the comb are thus withdrawn from the slots 67, with which they engage, and, under the action of a light spring, the trigger is moved downwardly to maintain engagement with the pin. During this movement of the batching bar 70, to the cut-off position one end of the bar turns a bell crank lever 74 to compress spring 73 and to move a diverting plate 75, through a slot 18 in the bottom of the hopper 2, into a position in which it ejects coins from the pockets of the coin conveying disc 3, into the hopper before they reach the record controlling pin 14, so that the machine ceases to sort and record coins fed to the hopper. This longitudinal movement of the bar also causes the other end to move beyond the shorter arm 76, of a J-shaped member 77, which shorter arm has its free end normally resting against the under side of the batching bar. The longer arm 78 of the J-shaped member terminates in a press button 79. When the J-shaped member is clear of the batching bar a spring 80 moves the said J-shaped member upwardly so that the shorter arm is located behind the batching bar to lock it in its advanced position. This movement of the J-shaped member is also transmitted through linkage 81, to a micro-switch 82, to close a circuit and cause a warning lamp at 83, to be illuminated. The movement of the batching bar also serves to actuate a lever (not shown), whereby a switch controlling the circuit of an electric motor driving the main shaft 5 is opened. The fully filled bag can then be replaced and, on subsequent depression of the press button 79, and the J-shaped member the return spring 73 moves the batching bar from its cut-off position to its initial position in which it locks the press button in its depressed condition and allows the diverting plate 75 to be moved to its inoperative position and the machine again becomes fully operative. Obviously only the recording mechanisms for the specific denominations of coins are provided with such batching mechanisms.

In connection with the recording mechanisms associated with the spindle 44, there is also provided a zeroizing means which may be locked against unauthorised use by a key operated lock. Such zeroizing means may be operated through gearing 86, which can be coupled to the main driving shaft when required, for example by a manually operable lever 87, as shown.

Whilst the movement of the batching bar may be employed to open the motor circuit it is in some cases desirable that reclosing of

the motor circuit is controlled by a separate press button switch which may have associated therewith a key controlled lock. Unauthorised operation of the machine is thus avoided.

5 The apparatus may be modified so that the fingers or projections on the several pawl carrying discs rotatable about the spindle 44, may pass through their associated notches in the selector bar to differing amounts depend-  
10 ing upon the value of the coin to be recorded by their associated recording mechanisms. The pawls on the pawl carrying discs are thus caused to ride over one or several teeth of the recording mechanisms according to the value  
15 of the coin being recorded. In this case the recording or counting wheels and their transfer mechanism must also be suitably modified.

According to a further modification only one set of recording mechanisms may be em-  
20 ployed. In this case, for example the pawl bearing discs associated with such recording mechanisms may be provided with two radial fingers or projections one of which co-acts with the selector bar whilst the other co-acts  
25 with the swinging bar.

The invention is not confined to sorting apparatus in which the coins are conveyed in a hopper to the sorting station by a rotating conveyor disc. An endless belt may be em-  
30 ployed for so conveying the coins which may be fed to it in succession by a chute from a hopper or other coin receiver.

#### WHAT I CLAIM IS:—

1. An apparatus for sorting mixed coins into  
35 separate denominations, the coins being fed to different stations according to their diameters and the passage of each coin towards its station adjusts and controls the operation of mechanism for counting and recording the  
40 values of the coins, wherein uniform sized recesses or pockets are provided to convey the coins during part of their travel to their collection stations whereby the coins project be-  
45 yond the said recesses or pockets to different extents, depending on their diameters, and a controlling member, movable by each of the coins as it travels in a recess or pocket, oper-  
50 ates mechanism to actuate and select the counting and recording mechanisms for record- ing the value of the coin passing said con-  
trolling member.

2. An apparatus as claimed in Claim 1, wherein each recess or pocket includes two straight edges which converge towards one  
55 another from the mouth of the recess or pocket.

3. An apparatus as claimed in Claim 1 or in Claim 2, comprising a rotatable disc with recesses or pockets in its periphery for the

reception of coins, a radially movable record  
60 controlling pin located adjacent the periphery of the disc and a series of apertures of progressively increasing width located in the path of travel of the coins beyond the record con-  
65 trolling pin, said apertures being connected to collecting stations by chutes or like conveying means.

4. An apparatus as claimed in Claim 3, wherein the record controlling pin controls the operation of a gate that selects the counting  
70 and recording mechanism to be operated.

5. An apparatus as claimed in Claim 4, wherein the gate consists of a longitudinally movable selector bar having notches along one  
75 edge each of which can be brought into register with a counting and recording mechanism release device for recording one denomination of coins.

6. An apparatus as claimed in Claim 4, or in Claim 5, wherein the gate or selector bar is provided with a stop which co-acts with a  
80 member which is operated by the controlling member actuated by the coins to locate the gate or selector bar.

7. An apparatus as claimed in Claim 6, wherein the gate or selector bar is actuated  
85 by a cam, against the action of a spring, away from the member operated by the controlling member prior to the adjustment of its position by the action of a coin upon the controlling  
90 member.

8. An apparatus as claimed in any of Claims 1 to 7, wherein two sets of mechanisms for counting and recording each denomination of  
95 coins and the total value thereof are provided, the mechanism of each set for like recordings being ganged together.

9. An apparatus as claimed in any of Claims 1 to 8, wherein upon a predetermined value of coins being collected at any one collecting  
100 station, a deflector plate is moved into the path of the coins being fed towards the controlling member to eject the coins from the recesses or pockets.

10. An apparatus as claimed in any of Claims 1 to 8, wherein upon a predetermined value of coins being collected at any one  
105 station a tripping device associated with a mechanism for counting and recording such coins is released to lock such recording  
110 mechanism.

11. An apparatus as claimed in Claim 9 or in Claim 10, wherein when the deflector plate or tripping device is actuated the circuit is  
115 broken of an electric motor for driving the apparatus.

12. An apparatus for sorting mixed coins into separate denominations and for recording the values thereof, constructed, arranged and

operating substantially as described with reference to the accompanying drawings.

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Chartered Patent Agent,  
Agent for the Applicant.

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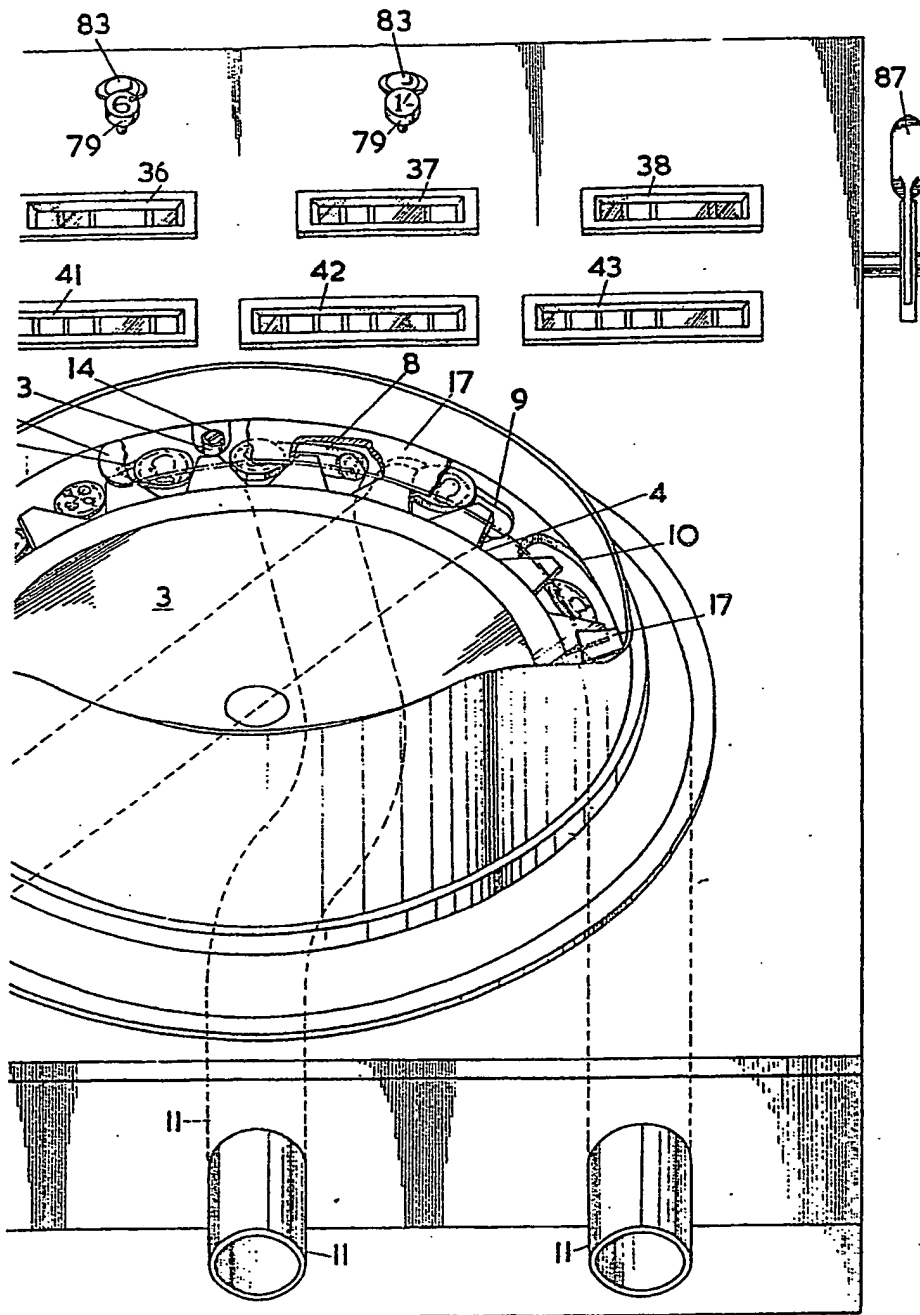
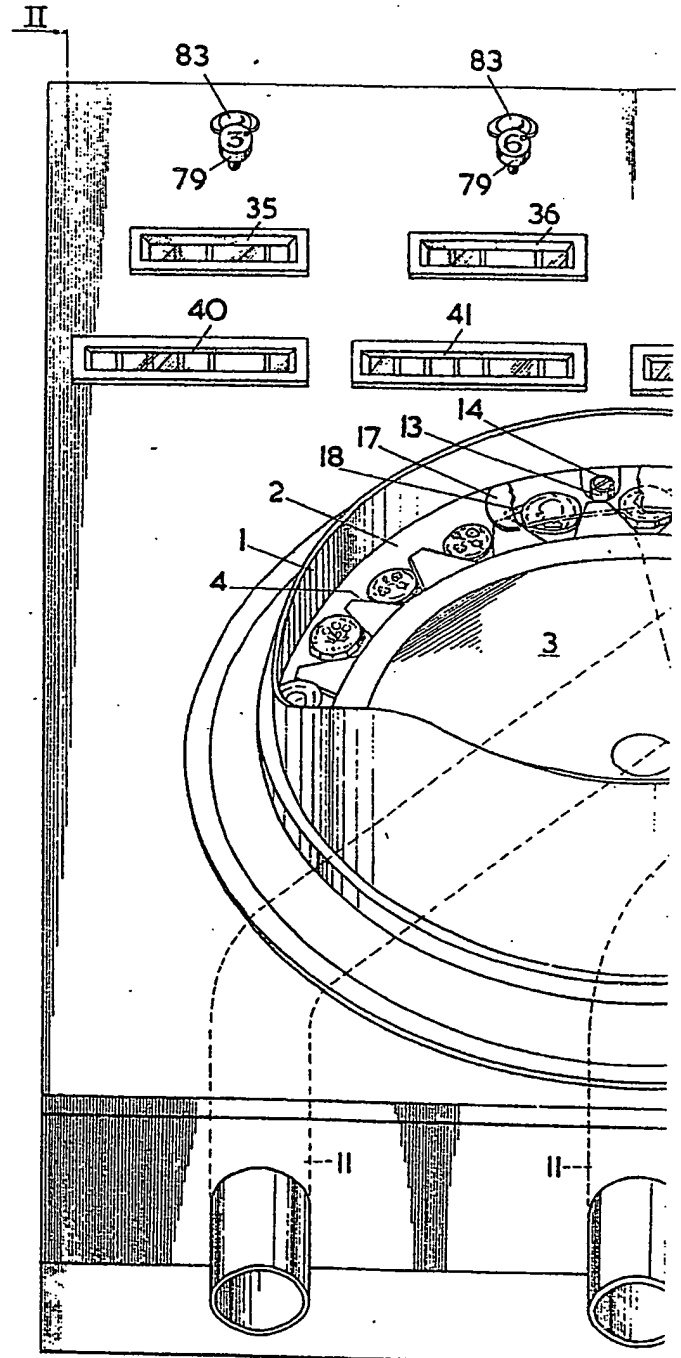
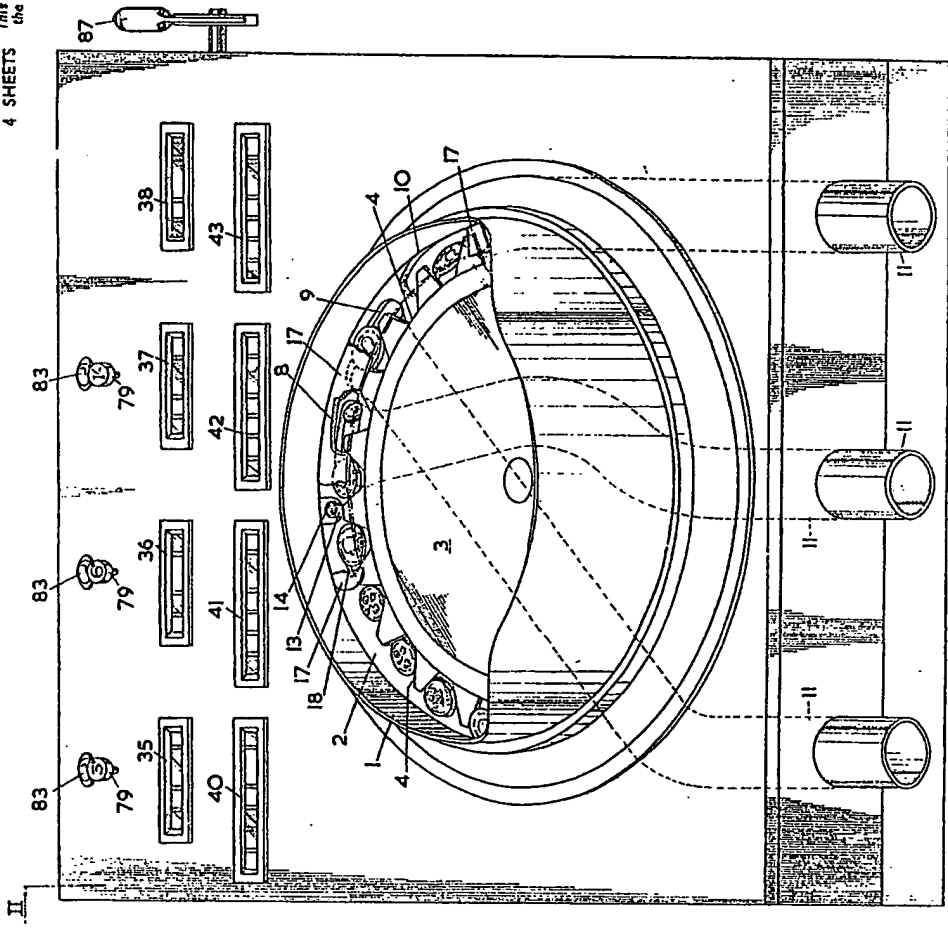


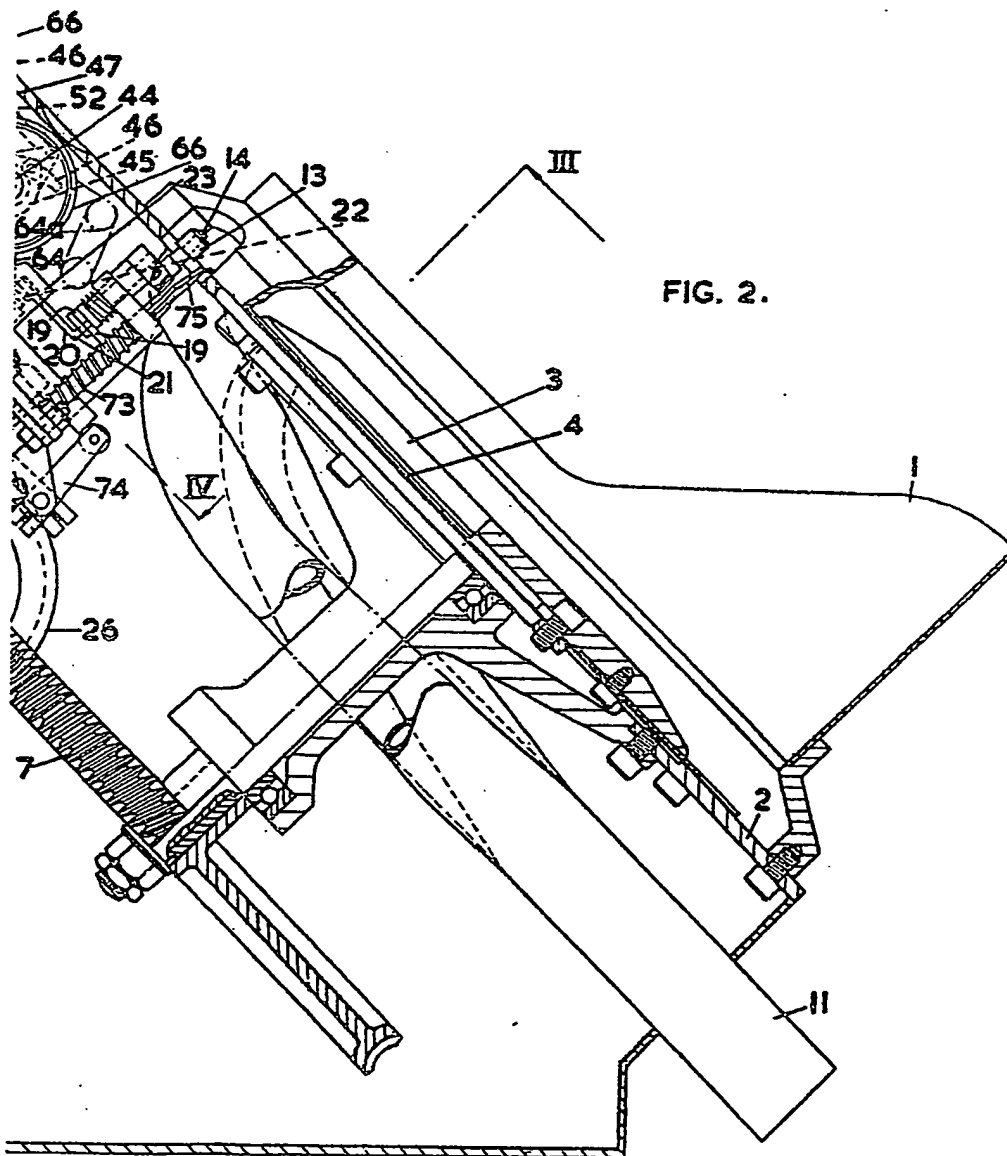
FIG. 1.

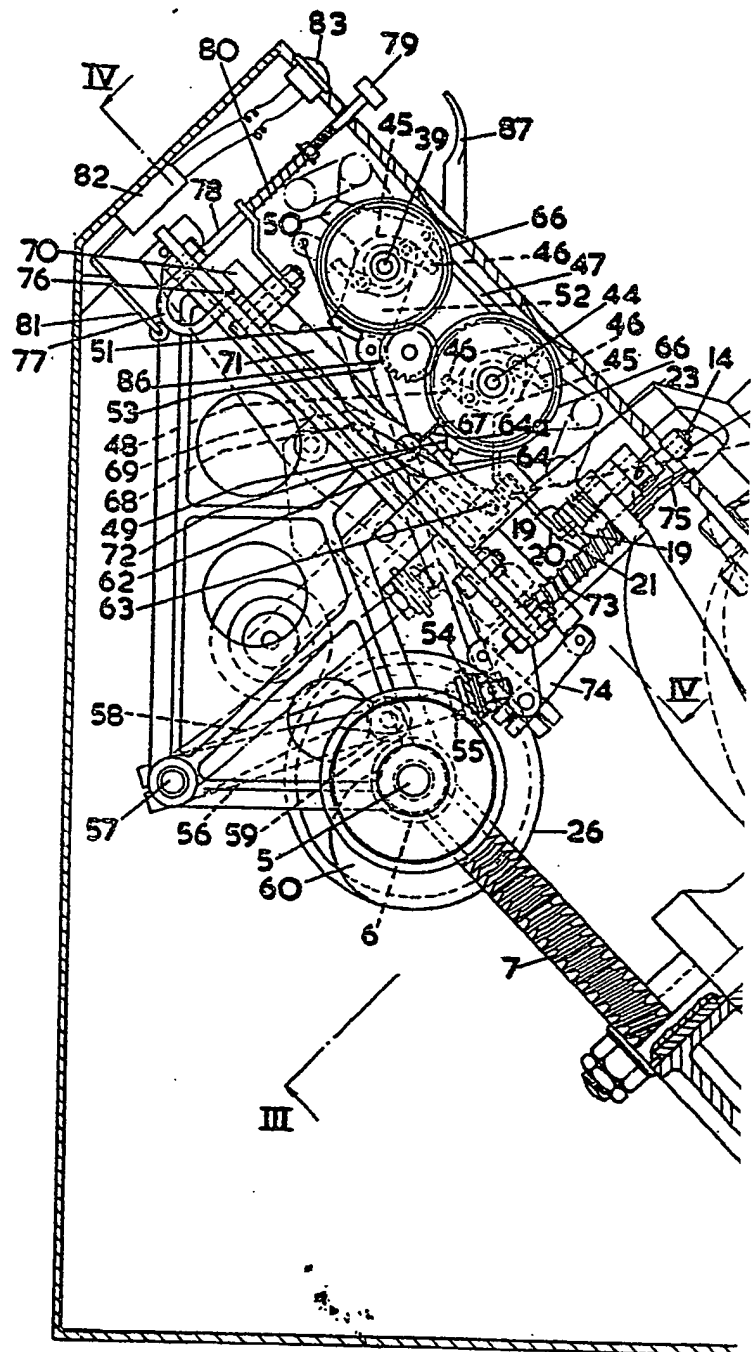






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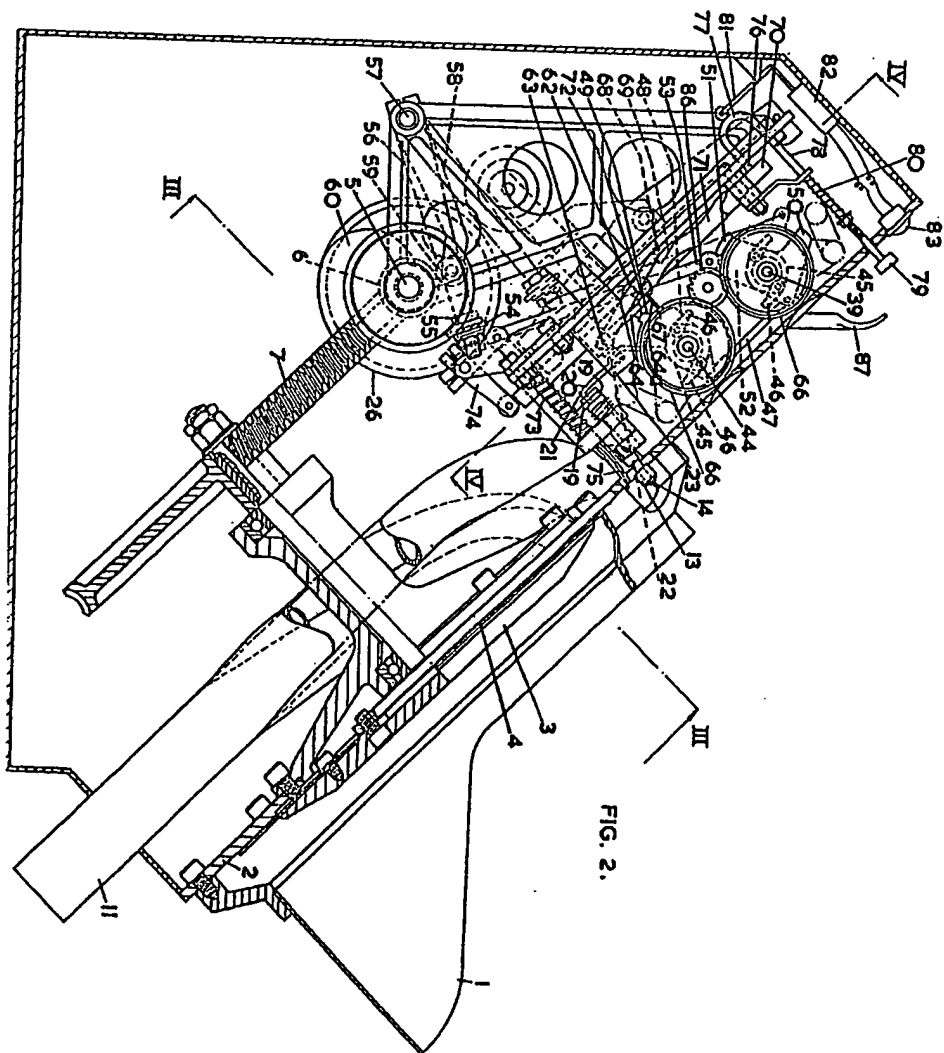
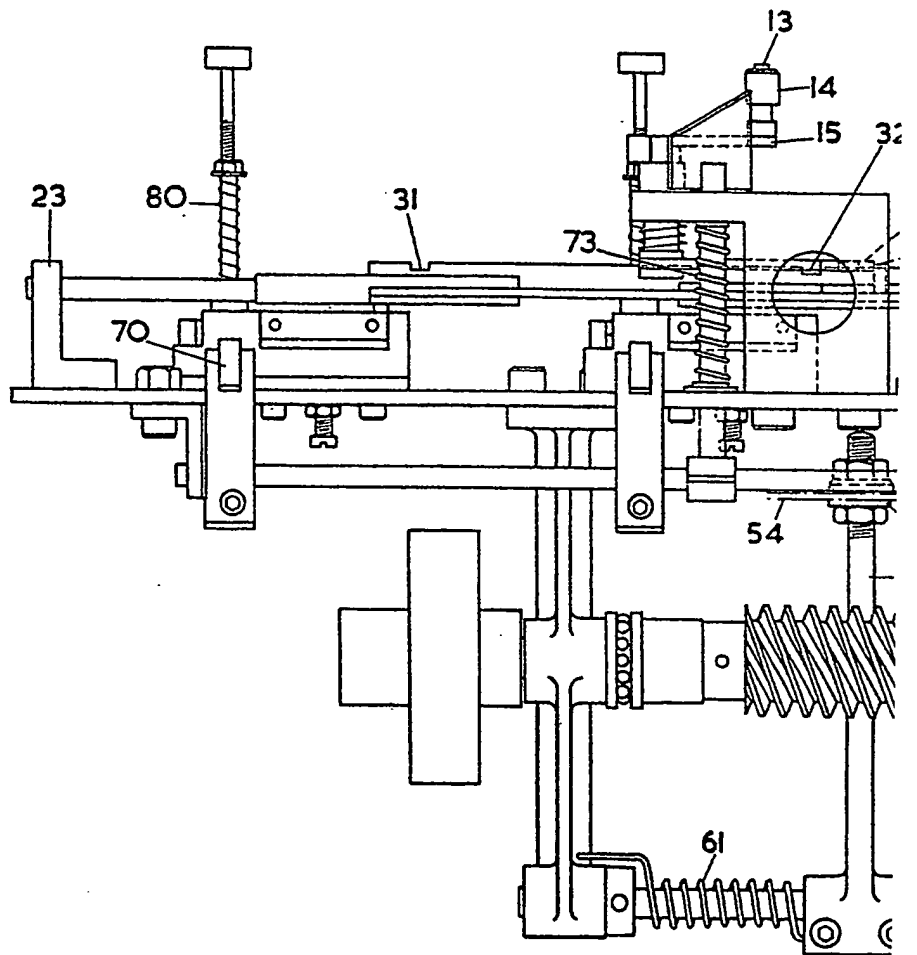


FIG. 2.

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Sheet 2



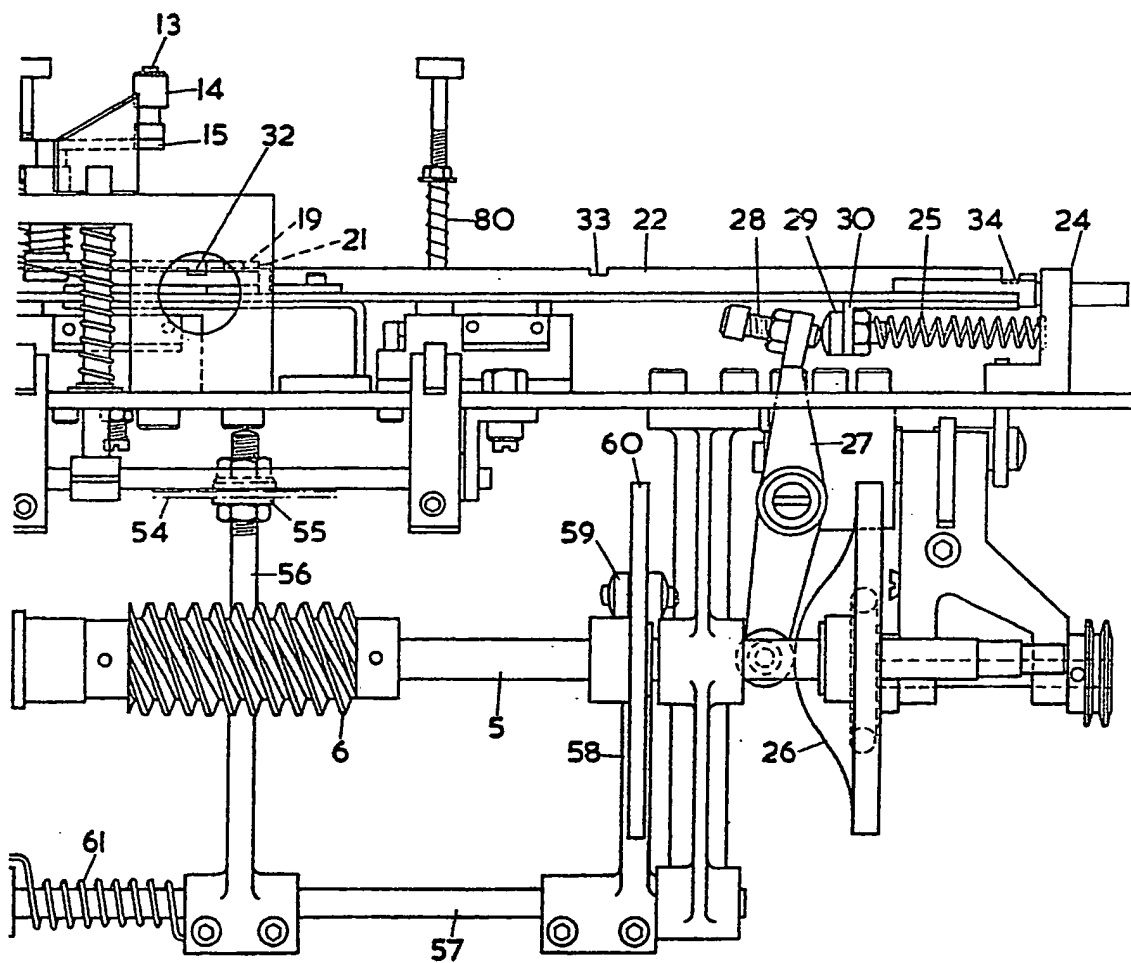


FIG. 3.

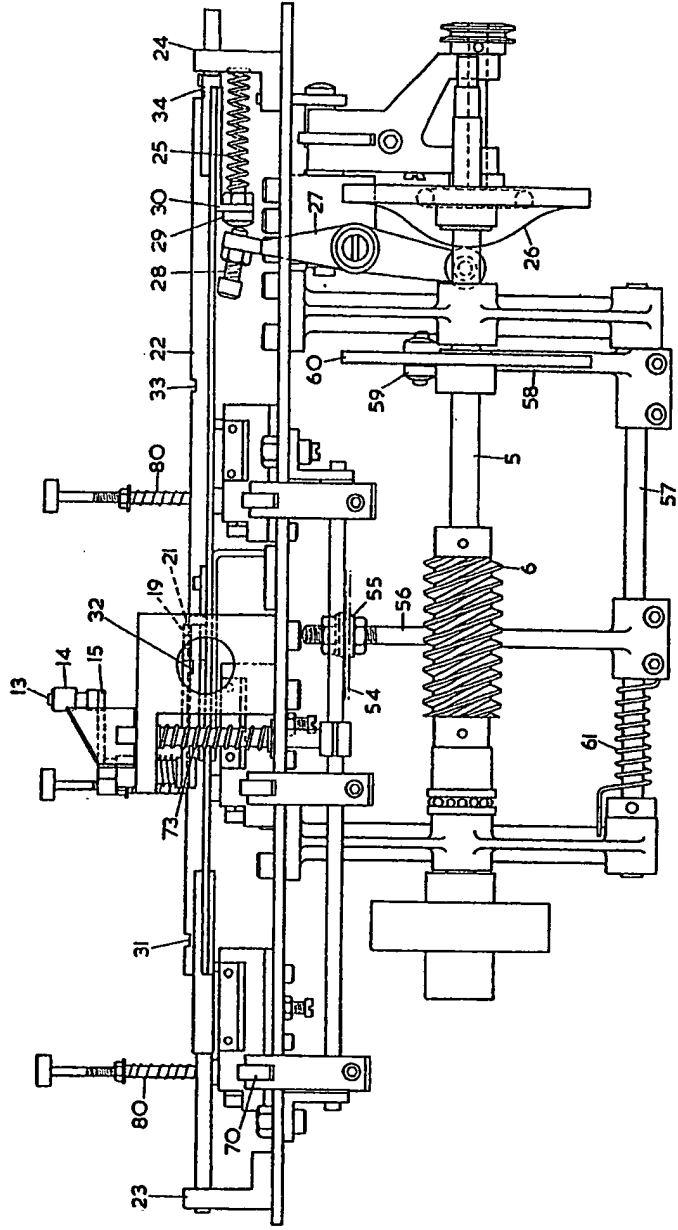


FIG. 3.



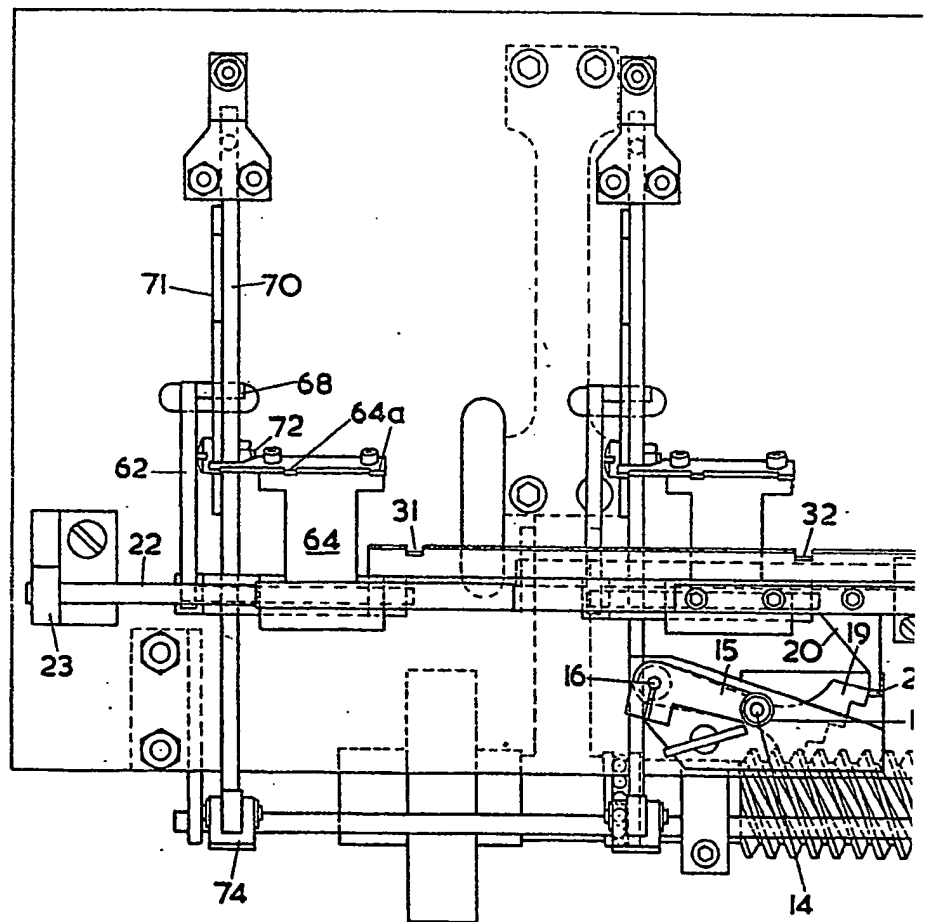


FIG. 4

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COMPLETE SPECIFICATION

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Sheet 4*

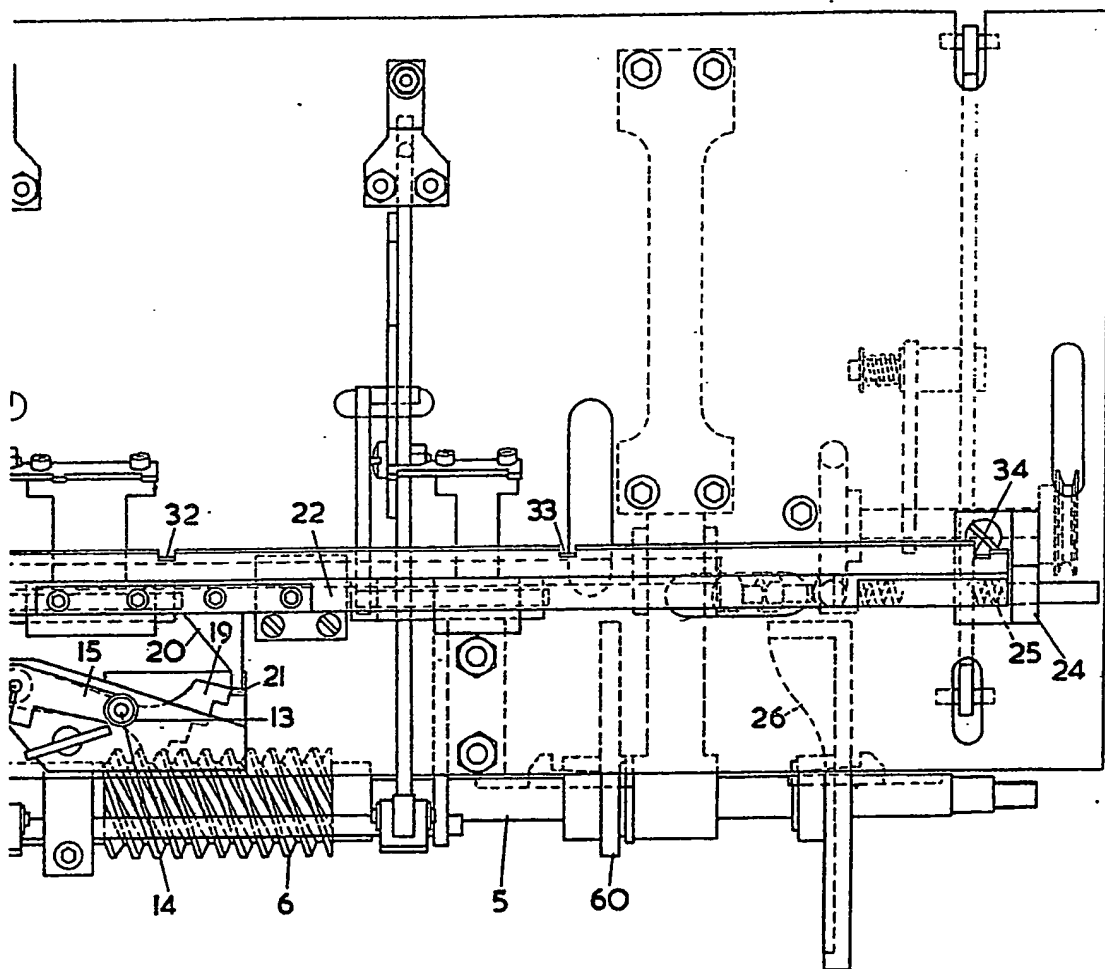


FIG. 4.

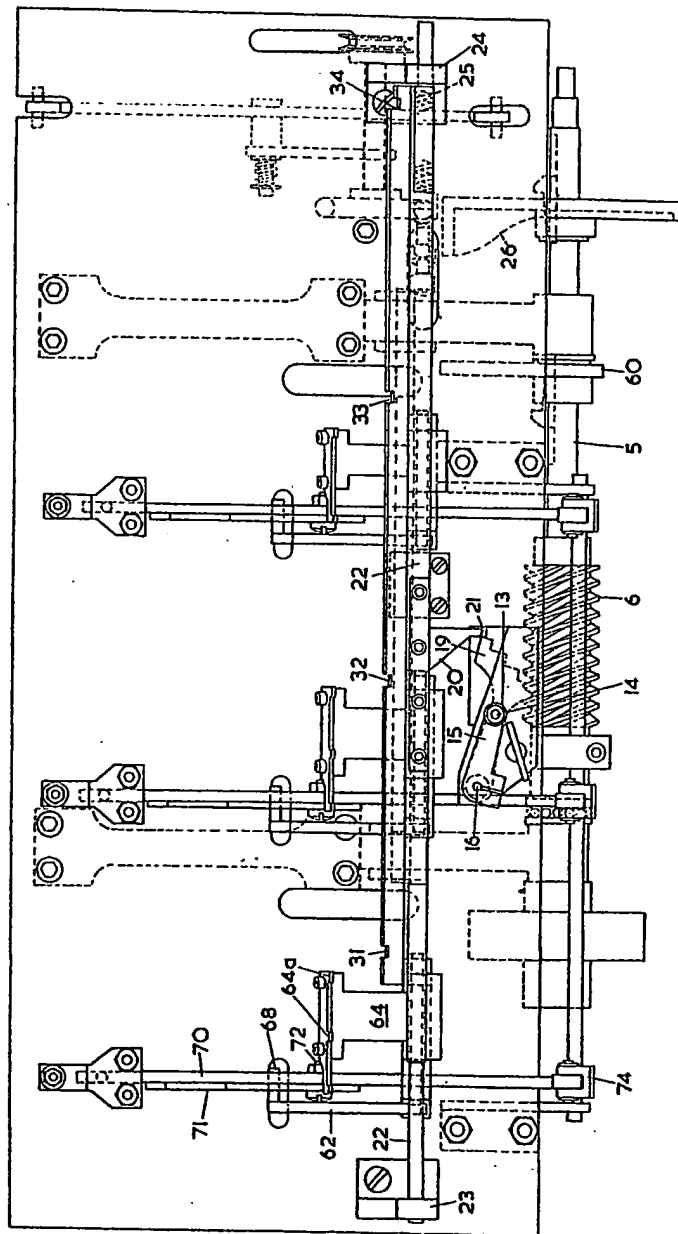


FIG. 4.